

## PATENT ABSTRACTS OF JAPAN

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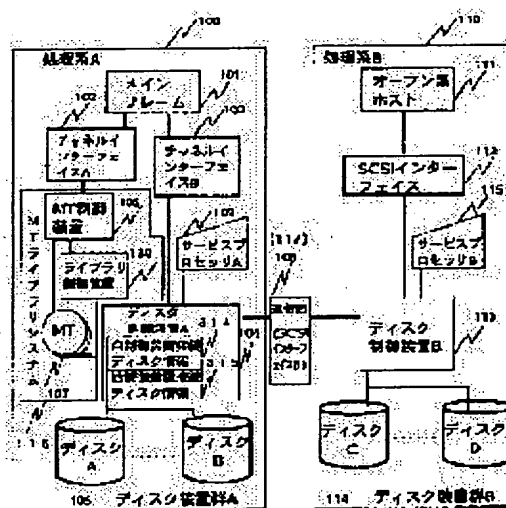
(72)Inventor : FUKUZAWA YASUKO  
YAMAMOTO AKIRA  
NAKANO TOSHIO

## (54) COMPOSITE COMPUTER SYSTEM AND COMPOSITE I/O SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To back up data of an I/O sub-system for opening in a backup system of main frame management which is not directly connected to this I/O sub-system.

SOLUTION: A B-system I/O sub-system (113 and 114) for opening and an A-system I/O sub-system (104 and 105) for main frame are connected by a communication means, and the A-system I/O sub-system is provided with tables 314 and 315 to assign a storage device address in its own sub-system to a storage device of the I/O sub-system for opening so that data in the B-system I/O sub-system can be accessed from the main frame for the purpose of backing up data of a disk connected to the B-system I/O sub-system in an MT library system 116, and a request in a variable length recording form accepted from the main frame is converted to a fixed length recording form of the B system, and a designated disk is accessed based on tables, and obtained data is sent to the main frame and is backed up in the backup system.



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CLAIMS

[Claim(s)]  
[Claim 1] The 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out read/write. The device address in the external storage address included in said read/write demand It is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem. A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem. Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. The complex computer system characterized by having the means sent to said 2nd I/O subsystem.

[Claim 2] The 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer. The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The lead demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should lead data. It has a means to back up the data received from said 1st I/O subsystem to said backup system. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the lead demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be led. The device address in the external storage address included in said lead demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said lead demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said lead demand

according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the lead demand according to said fixed-length interface. The complex computer system characterized by having a means to send the data received from delivery and said 2nd I/O subsystem to said 2nd I/O subsystem to said 1st host computer. [Claim 3] The 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer. The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The light demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should carry out the light of the data. It has a means to send the data read from said backup system to said 1st I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the light demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out a light. The device address in the external storage address included in said light demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said light demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said light demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the light demand according to said fixed-length interface. The complex computer system characterized by having a means to send said data received from delivery and said 1st host computer to said 2nd I/O subsystem to said 2nd I/O subsystem.

[Claim 4] It connects with the 1st I/O subsystem. the 1st I/O subsystem containing one or more external storage -- this -- It is the compound I/O system connected to the host computer including the 2nd I/O subsystem containing one or more external storage. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the read/write demand which specified the external storage address which should be carried out read/write is received from said host computer. The device address in said specified external storage address is not assigned to the external storage contained in said 1st I/O subsystem. The compound I/O system characterized by having a means to send said read/write demand to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem.

[Claim 5] The 1st I/O subsystem which has a variable-length record formal interface and contains one or more external storage. The 2nd I/O subsystem which contains one or more external storage with a fixed-length record formal interface. The transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem is included. It is the compound I/O system connected to the host computer. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said host computer, including the external storage address which should be carried out read/write. The device address in the external storage address included in said read/write demand It is not assigned to the external storage contained

in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem. Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. The compound I/O system characterized by having the means sent to said 2nd I/O subsystem.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Since access interfaces differ, this invention relates to the system which connected two or more I/O subsystems with which access interfaces differ to the system and host computer whose backup of the data of a store is enabled between the host computer which cannot carry out direct continuation, and an I/O subsystem.

[0002]

[Description of the Prior Art] arrangement of the optimal data, and the data administration facility to the large-scale memory hierarchy (storage hierarchy) who combined in the mainframe the external storage with which processing speed differs from memory capacity and an integrated storage management function aiming at efficient administration support --- substantial --- \*\*\* --- for example, DFSMS (Data Facility Storage Management Subsystem) of IBM --- corresponding --- "IBMSYSTEMS JOURNAL, Vol.28, No.1, and 1989 ---" --- the detail is indicated. The disk data of the I/O subsystem of a main frame can be backed up through this function manager to the magnetic tape with which bit cost can store cheap or mass data, or a medium called a magnetic tape library. On the other hand, in open systems, such as a personal computer and a workstation, a medium called the magnetic tape and the magnetic tape library which can store mass data like a main frame is not equipped.

[0003] Generally, with open systems, such as a personal computer and a workstation, access to a disk is performed according to the fixed-length-record format, and access to a disk is performed according to the variable-length record format called count key data format with the main frame. For this reason, the disk subsystem for main frames and the disk subsystem for open systems are constituted separately in many cases. On the other hand, at US No. 005155845, the technique which transmits and receives data is exhibited by I/O intersubsystem.

[0004]

[Problem(s) to be Solved by the Invention] Since host computers differ, in the disk subsystem for open systems, and the disk subsystem for main frames, employment of backup etc. and management are carried out according to the individual. However, as already stated, since there is no medium called the magnetic tape and the magnetic tape library which can store mass data in an open system, it is effective in it to take backup to the I/O subsystem of a main frame. However, since interfaces differ, the disk system for the usual open systems cannot carry out direct continuation with a mainframe. On the other hand, by US No. 005155845, it is not indicated to be a host computer how read/write processing to the storage system by which direct continuation is not carried out is realized.

[0005] Since access interfaces differ, the purpose of this invention is to offer the host computer which cannot carry out direct continuation, and the system which backs up the data of a store between I/O subsystems. It is offering the system which backs up the data of the I/O subsystem of an open system from the main frame with which direct continuation especially of the I/O subsystem concerned is not carried out. Moreover, other purposes of this invention are to the storage of the I/O subsystem for open systems by which direct continuation is not carried out to a main frame to enable access from a main frame. Moreover, the purpose of

further others of this invention is to offer the system which made connectable two or more I/O subsystems with which interfaces differ in a main frame.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention The 1st host computer, The 1st I/O subsystem which direct continuation is carried out to said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out read/write. The device address in the external storage included in said read/write demand It is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem. A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem. Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. He is trying to have the means sent to said 2nd I/O subsystem.

[0007] Moreover, the 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer, The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The lead demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should lead data. It has a means to back up the data received from said 1st I/O subsystem to said backup system. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the lead demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be led. The device address in the external storage included in said lead demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said lead demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said lead demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the lead demand according to said fixed-length interface. He is trying to have a means to send the data received from delivery and said 2nd I/O subsystem to said 2nd I/O subsystem to said 1st host computer.

[0008] Moreover, the 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer, The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which

connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The light demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should carry out the light of the data. It has a means to send the data read from said backup system to said 1st I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the light demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out a light. The device address in the external storage address included in said light demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said light demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said light demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the light demand according to said fixed-length interface. He is trying to have a means to send said data received from delivery and said 1st host computer to said 2nd I/O subsystem to said 2nd I/O subsystem.

[0009] Moreover, the 1st I/O subsystem containing one or more external storage. Connect with the 1st I/O subsystem and the 2nd I/O subsystem containing one or more external storage is included. This — It is the compound I/O system connected to the host computer. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem which stores the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the read/write demand which specified the external storage address which should be carried out read/write is received from said host computer. The device address in said specified external storage address is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, he is trying to have a means to send said read/write demand to said 2nd I/O subsystem.

[0010] Moreover, the 1st I/O subsystem which has a variable-length record formal interface and contains one or more external storage. The 2nd I/O subsystem which contains one or more external storage with a fixed-length record formal interface. The transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem is included. It is the compound I/O system connected to the host computer. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said host computer, including the external storage address which should be carried out read/write. The device address in the external storage address included in said read/write demand It is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem. Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. He is trying to have the means sent to said 2nd I/O subsystem.

[0011]

[Embodiment of the Invention] Hereafter, a drawing explains one example of this invention.

[0012] Drawing 1 is drawing showing an example of the computing system set as the object of this invention. A processor A100 consists of a main frame 101, the channel interface A102, the channel interface B103, the magnetic tape (MT) control device 106, the magnetic tape-library control device 130, the magnetic tape library 107, a disk controller A104, a disk unit group A105,

and a service processor 109. A main frame 101 accesses a disk controller A104 through the channel interface B103 according to the variable-length record format called count key data format. Here, count key data format is a record format which constitutes the record used as the unit of read/write from the three fields called a count area, the key section, and data division. At a count area, the data which an application program uses are stored in the key information for accessing this record, and data division at a record identification entry child and the key section. In addition, the magnetic tape (MT) control device 106, the magnetic tape-library control device 130, and the magnetic tape library 107 are hereafter referred to as an MT library system 116 collectively. As a memory hierarchy connected through a channel interface, there is not only a magnetic tape but an optical disk etc. Below, the case where MT library system 116 is connected is shown in an example.

[0013] The containment equipment connection disk information 314 and the other control-devices connection disk information 315 are included in a disk controller A104. The containment equipment connection disk information 314 and the other control-devices connection disk information 315 are the information established in order to enable access of the disk unit of an I/O subsystem by which direct continuation is not carried out from a main frame. About this detail, it mentions later.

[0014] A processor B110 consists of the opening system host 111, SCSI interface (Small Computer System Interface) 112, a disk controller B113, a disk unit group B114, and a service processor B115. The record used as the unit of read/write accesses the opening system host 111 through SCSI interface 112 which is a fixed length at a disk controller B113. The disk controller A104 and the disk controller B113 are connected by the channel 108. The SCSI cable b117 is sufficient as a channel 108. Hereafter, a CKD format, and a call and a fixed length block format are called a FBA (Fixed Block Architecture) format for count key data format. Hereafter, a CKD record and the record of a FBA format are called a FBA record for the record of a CKD format.

[0015] Drawing 2 is drawing showing other examples of the computer system set as the object of this invention, and the I/O subsystem for two or more open systems is connected to one I/O subsystem for main frames. At a processor X120, the interface of the opening system host X121 and a disk controller X123 is Fibre. It connects with the Channel interface 122. Fibre The Channel interface 122 is an optical cable and can expand the connection distance between control units with a host. However, it is Fibre which used SCSI as the base between a host and a control device. A Channel interface is adopted in many cases. Moreover, between a disk controller X123 and disk controllers B113 is Fibre. You may connect with an interface like the Channel interface X126.

[0016] The data backup in the configuration of drawing 2 serves as an escape of the data backup in the configuration of drawing 1 R> 1. Fundamental actuation of each equipment accesses the magnetic tape library 107 a mainframe 101 and whose opening system hosts 111 and 121 are external storage through each interface or the disk unit group A105, the disk unit group B114, and the disk unit group X124. The operating system of arbitration with which the process of a main frame 101 supports a channel interface. Under the control of VOS3 (Virtual-storage Operating System3) etc. of Hitachi, for example, moreover, an opening system host's process The operating system of the arbitration which supports a SCSI interface. For example, the path of DETAHE stored outside through each interface under control of operating systems, such as UNIX (UNIX is a trademark in the U.S. of an X/Open company and other countries), is established.

[0017] Drawing 3 is drawing showing the configuration of a disk controller A104. A disk controller A104 consists of Buss 308 who connects between MPU302 which performs the control-system process 307 of this disk controller, a memory apparatus 301, the host data transfer unit 303, disk cache equipment 304, the I/O intersubsystem data transfer unit 305, the disk transfer equipments 306, and these equipments. The control-system process 307 operates in multitasking or a multiprocessor environment. The various micro programs 312 and various data 313\*\*s are contained in a memory apparatus 301. Especially, in the case of the disk controller A104, as explanation of drawing 1 R> 1 also described, the containment equipment connection

disk information 314 and the other control-devices connection disk information 315 are stored. Since a disk controller B113 and a disk controller X123 are also the same configurations, it omits. However, in the case of a disk controller B113 and a disk controller X123, it is not necessary to include the contingency equipment connection disk information 314 and the other control-devices connection disk information 315.

[0018] The contingency equipment connection disk information 314 shows connection relation, such as a control device stored in the memory apparatus 301 of a disk controller A104. The contingency equipment connection disk information 314 is information which exists in disk unit correspondence. The contingency equipment connection disk information 314 is shown in drawing 4. The device address 400 is an identifier for identifying disk \*\* which the host computer of main frame 101 grade makes a read/write object, and the host computer of main frame 101 grade is the information included also in the read/write demand to publish. It is the information the disk unit corresponding to this control-device connection disk information 314 in the contingency equipment initial entry 401 indicates it to be whether it has actually connected with the control device. The other control-devices connection pointer 402 means whether this control-device connection disk information 314 is assigned to the disk unit connected to other control devices. When assigned, a pointer corresponds and also points to the control-device connection disk information 315. A pointer is a null value when not assigned. Therefore, when the other control unit connection pointer 402 is effective, the contingency equipment initial entry 401 is in the condition of not being assigned (when the device address 400 is assigned to the disk unit connected to other control units). Moreover, when the other control unit connection pointer 402 is invalid, the condition that the contingency equipment initial entry 401 is not assigned may be shown (when the device address 400 is not assigned to the disk unit connected to other control units). That is, there may be the condition of the device address 400 not being assigned to the disk unit linked to contingency equipment, either, and not being assigned to the disk unit connected to other control devices. An attribute 403 is shown in drawing 5 which is the information on equipment proper, such as an interface of the corresponding disk unit, a function, a data format type, and the block length, and also the control-device connection disk information 315 is the information corresponding to the disk unit which has not carried out direct continuation to a disk controller A104. The other control-devices connection disk information 315 will be pointed at from either of the contingency equipment connection disk information 314. The address of the control device to which the disk unit corresponding to the control-device connection disk information 315 besides a book in the connection control-device address 500 is connected is stored. The disk controller B113 will be stored in this example. A disk address 501 shows the address currently assigned in the control unit actually connected to the corresponding disk unit. The contingency equipment connection disk information 314 and the other control-devices connection disk information 315 are set up from a service processor 109. [0019] In this example, by using for the information on drawing 4, the contingency equipment connection disk information 314 shown in drawing 5, and the other control-devices connection disk information 315, as shown in drawing 6, it is recognized as the disk unit group B114 (Disk C, Disk D) connected through the disk controller B113 being connected to a disk controller A104 from the main frame 101. This is because the disk controller A104 is assigning the address of the disk unit which is vacant in the disk controller A104 to the disk unit of the I/O subsystem of an opening system.

[0020] Hereafter, the contents of processing of a backup process are explained using drawing 1 R> 1, drawing 7, and drawing 8. Specifically in drawing 1, the data of the disk unit group B114 of the opening system of Processor B are backed up to MT library system 116 through the disk controller A104 of Processor A, and a main frame 101. On the contrary, the data which backed up to MT library system 116 are restored in the disk unit group B114 of the opening system of Processor B through the main frame 101 of Processor A, and a disk controller A104. The above-mentioned backup and restoration first explain the case which backs up the data of the disk unit group B114 of the opening system of Processor B to MT library system 116 through the disk controller A104 of Processor A, and a main frame 101 where it performs with directions by the mainframe 101. In addition, as already stated, it is recognized as the disk unit group B114 (Disk

C, Disk D) being connected to a main frame 101 at the disk unit A104. Therefore, a lead demand is published, and actuation of a main frame 101 is not only especially explained to a disk controller A104, in order to only back up the received data to MT library system 116.

[0021] When backing up to MT library system 116, a main frame 101 publishes a lead demand to a disk controller A104. A disk controller A104 performs processing in response to the lead demand from a mainframe 101 according to the flow Fig. of drawing 7. First, the corresponding contingency equipment connection disk information 314 is found out at step 700 from the address of a disk unit specified within the lead demand. At step 701, the specified disk unit confirms whether to connect with the disk controller A104. If it connects with the disk controller A104, the data which correspond from the disk unit will be read at step 702. If it does not connect with the disk controller A104, at step 703, the specified disk unit confirms whether to connect with other disk controllers (disk controller B113). That is, it is checked a null value for the other control-devices connection pointer 402. It is a null value as a result of the check, and when not connecting, an error report is performed at step 704.

[0022] The actuation especially related to this invention is 705 or less step [ which the specified disk unit performs when connecting with other disk controllers (disk controller B113) ] actuation. First, do not become a null value as a result of a check, but when connecting in step 705, it is based on the value of the other control unit connection pointer 402. Correspond to the specified disk unit, and also the control-device connection disk information 315 A header. It found out and also the specified disk unit gains the address of the disk controller (disk controller B113) actually connected, and the address of the disk unit in the inside of the disk unit group B connected to the disk controller based on the control-device connection disk information 315. Next, at step 706, the address of the data to lead received by the lead demand is changed into the format of a disk unit of having connected with the disk controller B113.

[0023] In the read/write demand from a main frame 101, the address of the data to write is usually specified by the cylinder number, the head number, and the record number according to a CKD format. Hereafter, the record address expressed with a cylinder number, a head number, and a record number is called CCHHR. On the other hand, in the disk unit connected to the disk controller B113, it has the access interface specified by LBA (Logical Block Address) according to a FBA format. Therefore, at step 706, the access address of the data for a lead is changed into a FBA format from a CKD format. Transformation is for example, LBA=(C \* number of heads + H) \* Truck length + It can express like the record-number \* record length.

[0024] A demand is published [ reading data from the field calculated at step 706 of the corresponding disk unit to a disk controller B113, and ] at step 707. Step 708 waits for the demanded data to come from a disk controller B113. At step 709, delivery and processing are completed for the data received from the disk controller B113 to a mainframe 101. In order that the data demanded from the disk controller A104 may be read from the corresponding disk unit and disk controller B113 may only send them to a disk controller A104, especially a processing flow is not indicated.

[0025] Next, the case where the data which backed up to MT library system 116 are restored in the disk unit group B114 of the opening system of Processor B through the disk controller A104 of Processor A and a main frame 101 is explained. In addition, as already stated, it is recognized as the disk controller group B113 (Disk C, Disk D) being connected to a main frame 101 at the disk unit A104. Therefore, actuation of a main frame 101 is not especially explained, in order to only publish a light demand so that the data read from MT library system 116 to the disk controller A104 may be written in.

[0026] A disk controller A104 performs processing in response to the light demand from a mainframe 101 according to the flow Fig. of drawing 8. In the processing flow of drawing 8, since the processing in steps 800-801 and steps 803-806 is the same as the processing in steps 700-701 in drawing 7, and steps 703-706, explanation is omitted. Moreover, since the demand from a mainframe 101 is a light demand, step 802 usually serves as light processing.

[0027] Below, only a different part from drawing 7 is explained. At step 807, the demand which writes data in the field calculated at step 807 of the corresponding disk unit is published to a disk controller B113. Next, at step 808, it writes in from a main frame 1101 and data are sent to

a receipt and a disk controller B113. Next, if waiting and a completion report are received for the completion report of a light demand from a disk controller B113 at step 809, delivery and processing will be completed for a completion report to a mainframe 101. In order that the data demanded from the disk controller A104 may be read from the corresponding disk unit and control-device 113B may only send them to a disk controller A104, especially a processing flow is not indicated.

[0028] As mentioned above, although the system which backs up the data of the disk unit group B114 of the opening system of Processor B by Processor A was explained, it is good also considering the I/O subsystem which connects disk controller B and the disk unit group B to Processor A, and you may make it constitute the compound I/O system which connected two I/O subsystems with which interfaces differ in a main frame, and is connected to it in this case as other examples as three or more.

[0029] [Effect of the Invention] By this invention, backup of data is enabled in the I/O intersubsystem from which an access interface differs. Consequently, the data of the I/O subsystem of an opening system can be backed up to the I/O subsystem of a main frame. Moreover, since the backup device of a main frame contains large capacity, high performance, and MT library system of high reliance, they are high performance and a backup device of the main frame of high reliance, and can back up the data of the I/O subsystem of an open system. Moreover, it becomes possible to connect an I/O subsystem which is different in a main frame.

[Translation done.]



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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] It is drawing showing an example of the outline of the system of an example.
  - [Drawing 2] It is drawing showing other examples of the outline of the system of an example.
  - [Drawing 3] It is drawing showing the configuration of a disk controller.
  - [Drawing 4] It is drawing showing the configuration of continence equipment connection disk information.
  - [Drawing 5] It is drawing showing the configuration of other control-devices connection disk information.
  - [Drawing 6] It is drawing showing the connection relation of the disk unit seen from the main frame.
  - [Drawing 7] It is drawing showing an example of the processing flow of disk controller A at the time of backing up the data of the I/O subsystem of an opening system to MT library system of a main frame.
  - [Drawing 8] It is drawing showing an example of the processing flow of disk controller A at the time of restoring data in the I/O subsystem of an opening system from MT library system of a main frame.
- [Description of Notations]
- 101 Mainframe
  - 102, 103, 122 Channel interface
  - 111 121 Opening system host
  - 112 SCSI Interface
  - 104, 113, 123 Disk controller
  - 105, 114, 124 Disk unit group
  - 106 Tape Control
  - 107 Magnetic Tape Library
  - 108 Channel
  - 109, 115, 125 Service processor
  - 116 MT Library System
  - 130 Library Control Unit
  - 301 Memory Apparatus
  - 302 MPU
  - 303 Host Data Transfer Unit
  - 304 Disk Cache Equipment
  - 305 I/O Intersubsystem Data Transfer Unit
  - 306 Disk Transfer Equipment
  - 307 Control-System Process
  - 312 Micro Program
  - 313 Data
  - 314 Continence Equipment Connection Disk Information
  - 315 Other Control-Devices Connection Disk Information

[Translation done.]

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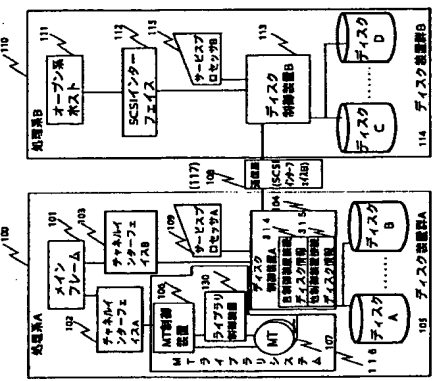
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(21)出願番号	特願平9-98369	(71)出願人	000005108 株式会社日立製作所
(22)出願日	平成9年(1997)4月1日	(72)発明者	東京都千代田区神田横河台四丁目6番地 福藤 孝子
		(72)発明者	神奈川県川崎市麻生区王禅寺1099番地 株 式会社日立製作所システム開発研究所内 山本 彰
		(72)発明者	神奈川県川崎市麻生区王禅寺1099番地 株 式会社日立製作所システム開発研究所内 中野 俊夫
		(74)代理人	神奈川県小田原市国府津2880番地 株式会 社日立製作所ストレージシステム事業部内 井理士 笹岡 茂 (外1名)

(54)【発明の名称】 複合計算機システムおよび複合I/Oシステム

(57)【要約】  
【課題】 オープン用のI/Oサブシステムのデータを核I/Oサブシステムに直接されないメインフレーム管理のバックアップシステムにバックアップする。  
【解決手段】 オープン用のB系I/Oサブシステム(113、114)とメインフレーム用のA系I/Oサブシステム(104、105)を通信手段で接続し、B系I/Oサブシステムに接続されたディスクのデータをMTライブラリシステムにバックアップするため、B系I/OサブシステムのデータをメインフレームからアクセスできるようにA系I/Oサブシステムに、自サブシステム内の空いている記憶装置アドレスをオープン用のI/Oサブシステム内の空いている記憶装置アドレスをオープン用のI/Oサブシステムの記憶装置に割り当てるためのテーブル(314、315)を設け、メインフレームから受け付けた可変長記憶形式の要求を、B系の固定長記憶形式に変換し、前記テーブルに基づき指定されたディスクにアクセスし、得られたデータをメインフレームに送り、バックアップシステムにバックアップする。

図1



【請求項の範囲】

【請求項1】 第1のホストコンピュータと、前記第1のホストコンピュータと可変長記憶形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1のI/Oサブシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記憶形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと、前記第2のI/Oサブシステムとを接続する通信機構を含む複合計算機システムであって、前記第1のI/Oサブシステムは、  
前記第1の外部記憶装置の装置アドレスと、該装置アドレスが第1または第2のI/Oサブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2のI/Oサブシステムの外部記憶装置の第2のI/Oサブシステムにおける装置アドレスとを格納するテーブルと、  
前記第1のホストコンピュータから、リード/ライトすべき外部記憶装置アドレスを含み、かつ、前記可変長記憶形式インターフェイスにしたがったリード/ライト要求を受け取った時、前記テーブルを参照して、前記リード/ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1のI/Oサブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2のI/Oサブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変長記憶形式インターフェイスにしたがった前記リード/ライト要求を、前記第2のI/Oサブシステムに送ることを決定する手段と、  
前記第2のI/Oサブシステムに送ることを決定した前記可変長記憶形式インターフェイスにしたがった前記リード/ライト要求を、前記固定長インターフェイスにしたがったリード/ライト要求に変換して、前記第2のI/Oサブシステムに送る手段を有することを特徴とする複合計算機システム。

【請求項2】 第1のホストコンピュータと、前記第1のホストコンピュータと可変長記憶形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1のI/Oサブシステムと、前記第1のホストコンピュータに接続されたバックアップシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記憶形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと前記第2のI/Oサブシステムとを接続する通信機構を含む複合計算機システムであって、  
前記第1のホストコンピュータは、前記第1のI/Oサブシステムに対して、データをリードすべき外部記憶装置のアドレスを含み、かつ前記可変長記憶形式インターフェイスにしたがったリード要求を発行して、前記第1のI/Oサブシステムから受け取ったデータを、前記第1

ックアップシステムにバックアップする手段を有し、  
前記第1のI/Oサブシステムは、  
外部記憶装置の装置アドレスと、該装置アドレスが第1または第2のI/Oサブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2のI/Oサブシステムの外部記憶装置の第2のI/Oサブシステムにおける装置アドレスとを格納するテーブルと、  
前記第1のホストコンピュータから、リードすべき外部記憶装置アドレスを含み、かつ、前記可変長記憶形式インターフェイスにしたがったリード要求を受け取った時、前記テーブルを参照して、前記リード要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1のI/Oサブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2のI/Oサブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変長記憶形式インターフェイスにしたがった前記リード要求を、前記第2のI/Oサブシステムに送ることを決定する手段と、  
前記第2のI/Oサブシステムに送ることを決定した前記可変長記憶形式インターフェイスにしたがった前記リード要求を、前記固定長インターフェイスにしたがったリード要求に変換して、前記第2のI/Oサブシステムに送る手段を有することを特徴とする複合計算機システム。  
【請求項3】 第1のホストコンピュータと、前記第1のホストコンピュータと可変長記憶形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1のI/Oサブシステムと、前記第1のホストコンピュータに接続されたバックアップシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記憶形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと前記第2のI/Oサブシステムとを接続する通信機構を含む複合計算機システムであって、  
前記第1のホストコンピュータは、前記第1のI/Oサブシステムに対して、データをリードすべき外部記憶装置のアドレスを含み、かつ前記可変長記憶形式インターフェイスにしたがったリード要求を発行して、前記第1のI/Oサブシステムから受け取ったデータを前記第1のI/Oサブシステムに送る手段を有し、  
前記第1のI/Oサブシステムは、  
外部記憶装置の装置アドレスと、該装置アドレスが第1または第2のI/Oサブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2のI/Oサブシステムの外部記憶装置の第2のI/Oサブシステムにおける装置アドレスとを格納するテーブルと、

前記第1のホストコンピュータから、ライトすべき外部記憶装置アドレスを含み、かつ、前記可変長記録形式ライティングフェーズにしたがったライト要求を受け取った時、前記テーブルを参照して、前記ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムに割り当てられる外部記憶装置に割り当てられている場合、前記可変長記録形式ライティングフェーズにしたがった前記ライト要求を、前記第2の1/0サブシステムに送ることを決定する手段と、

前記第2の1/0サブシステムに送ることを決定した前記可変長記録形式ライティングフェーズにしたがった前記ライト要求を、前記固定長ライティングフェーズにしたがったライト要求に変換して、前記第2の1/0サブシステムに送り、前記第1のホストコンピュータから受け取った前記データは、前記第2の1/0サブシステムに送る手段を有することを特徴とする演習計算機システム。

【請求項4】 1つ以上の外部記憶装置を含む第1の1/Oサブシステムと、該第1の1/Oサブシステムに接続され、1つ以上の外部記憶装置を含む第2の1/Oサブシステムとを含み、ホストコンピュータに接続された複合1/Oシステムであって、

前記第1の1/0サブシステムは、  
外配記装装置の装置アドレスと、該装置アドレスが第1  
または第2の1/0サブシステムの外部配装装置のいずれ  
に割り当てられているかを示す情報と、第2の1/0  
サブシステムの外部配記装装置に割り当てられている場合  
に該外部配記装装置の第2の1/0サブシステムにおける  
装置アドレスとを格納するテーブルと、

前記ホストコンピュータからリード/ライトを受け取る時、前記アドレスを指定したリード/ライト要求を受けた装置は、前記アドレスを参照して、指定された前記アドレスに記憶された前記アドレス中の装置アドレスが、前記第1のサブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2のサブシステムに含まれる外部記憶装置に割り当てられている場合、前記リード/ライト要求を前記第2のサブシステムに送る手段を有することを特徴とする場合1/3システム

【備考事項5】 可変記録形式インターフェースを持つ、1つ以上の外部記憶装置を含む第1の1/0サブシステムと、固定記録形式インターフェースを持つ1つ以上の外部記憶装置を含む第2の1/0サブシステムと、前記第1の1/0サブシステムと前記第2の1/0サブシステムとを接続する通信回路とを含み、ホストコンピュータに接続された複合1/0サブシステムであって、前記第1の1/0サブシステムは、

外部記憶装置の装置アドレスと、該装置アドレスが第1または第2の1/0サブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2の1/0

サブシステムの外部記憶装置に割り当てられている場合に、該外部記憶装置の第2の1/0サブシステムにおける装置アドレスとを格納するテーブルと、

前記ホストコンピュータから、リード/ライトすべき書き込みアドレスを求め、前記可変長記号形式のインターフェイスにしたがって、リード/ライト要求を受取った時、前記テーブルを参照して、前記リード/ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変長記号形式インターフェイスにしたがって前記リード/ライト要求を、前記第2の1/0サブシステムに送ることを決定する手段と、前記第2の1/0サブシステムに送ることを決定した前記可変長記号形式インターフェイスにしたがって前記リード/ライト要求を、前記母体インターフェイスにしたがってリード/ライト要求に変換して、前記第2の1/0サブシステムに送る手段とを有することを特徴とする複合1/0システム。

【発明の詳細な説明】

**【0001】**

【発明の属する技術分野】本発明は、アクセスインターフェイスが異なるために直接接続できないホストコンピュータと1/0サブシステムの間で配接装置のデータをバックアップ可能とするシステムおよびホストコンピュータにアクセスするソフトウェアによる複数の1/0サブシステムを接続したシステムに関する。

**[0002]**

【従来の技術】メインフレームでは、処理速度、記憶容量の異なる外部記憶装置を組み合わせた大規模な記憶階層およびストレージ階層)に対して、最適なデータ配置・および効率的な運用支援を目的とするデータ管理機能・統合ストレージ管理機能が充実にあり、例えば、IBMのDFSMS(Data Facility Storage Management Subsystem)が相当し、"IBM SYSTEMS JOURNAL", Vol. 28, No.1, 1989 に詳細が記載されている。本管理機能を介してメインフレームの1/Oサブシステムのディスクデータを、ビットコストが

アンビあるいは大容量のデータを格納できる磁気テープドライブという媒体が装備されていない。

【0003】 一般に、パソコンやワークステーション等のオープンシステムでは、固定長レコード形式に従ってディスクへのアクセスを行っており、メインフレームではカウントキープデータ形式と呼ばれる可変長レコード形

式に従ってディスクへのアクセスを行っている。このため、メインフレーム用のディスクサブシステムとオンラインシステム用のディスクサブシステムは別々に構成されることが多い。一方、US00515845号では、1/Oサブシステム間で、データを送受信する技術が公開されている。

0001

【疑問が解決しようとする課題】ホストコンピュータが異なるため、オープンシステム用のディスクサブシステムとメインフレーム用のディスクサブシステムでは、個別にバックアップ等の運用、管理をしている。しかし、すでにのべたように、オープンシステムには、大容量のデータを格納できる磁気テープや磁気テープライブラリといった媒体がないため、メインフレームのI/Oサブシステムにバックアップをとることは有効である。しかし、通常のオープンシステム用のディスクシステムは、インターフェイスが異なるため、メインフレームとは直接接続できない。一方、US05155845号で提案されているのは、ホストコンピュータとは直接接続されていないストレージシステムに対するリーダー/ライター処理をいかに実現するかについては、記載されていない。

ノルウェーの文化 1990

スが異なるため直接接続できないホストコンピュータと1/Oサブシステムの間で、記憶装置のデータをバックアップするシステムを提供することにある。特に、オーブシステム上の1/Oサブシステムのデータを、当該1/Oサブシステムとは直接接続されていないメインフレームからバックアップするシステムを提供することである。また、本発明の他の目的は、メインフレームには直接接続されていないオーブシステム用の1/Oサブシステムの配属装置に対し、メインフレームからのアクセスを可能にすることにある。また、本発明のさらに他の目的は、メインフレームにインタフェースの異なる2以上の1/Oサブシステムを接続可能にしたシステムを提供することにある。

[0006]

【例題】を解決するための手段(上記目的を達成するため)、本発明は、第1のホストコンピュータと、前記第1のホストコンピュータと可変長記憶装置インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1のI/Oサブシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記憶装置インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと前記第2のI/Oサブシステムとを接続する通信線路を含む複合計算機システムであり、前記第1のI/Oサブシステムは、外部記憶装置の装置アドレス、該装置アドレスが第1または第2のI/Oサブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2のI/Oサブシステムの外部記憶装

置に割り当てられている場合に該外部記憶装置の第2の1/0サブシステムにおける装置アドレスとを格納するテーブルと、前記第1のホストコンピュータから、リーダープラントへ外部記憶装置アドレスを含む、かつ、前記可変長記録形式インターフェイスにしたがったリード/ライト要求を受け取った時、前記テーブルを参照して、前記リード/ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1の1/0サブシステムに含まれる外部記憶装置に割り当てられておらず、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変長記録形式インターフェイスにしたがった前記リード/ライト要求を、前記第2の1/0サブシステムに送ることを決定する手段と、前記第2の1/0サブシステムに送ることを決定し、前記可変長記録形式インターフェイスにしたがった前記リード/ライト要求を、前記固定長インターフェイスにしたがったリード/ライト要求に変換して、前記第2の1/0サブシステムに送る手段を有するようにしている。

【0007】また、第1のホストコンピュータと、前記第1のホストコンピュータと可変長記録形式インターフ

を有する。第1の外部記憶装置を含む第1のI/Oサブシステムと、前記第1のホストコンピュータに接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第2のホストコンピュータに接続されたバックアップシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定量配形方式インターフェースで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと前記第2のI/O

サブシステムを接続する通信標準を含む場合計算機システムであり、前記第1のホストコンピュータは、前記第1の1/0サブシステムに対して、データをリクエストする外部の装置装置のアドレスを含む、かつ前記可変長記録形式インターフェイスにしたがったリクエストを発行して、前記第1の1/0サブシステムから受け取ったデータを、前記バックアップシステムにバックアップする手段

段を有し、前記第1の1/0サブシステムは、外部記憶装置の装置アドレスと、該装置アドレスが1または第1の1/0サブシステムの外部記憶装置のいずれかに割り当てられているかを示す情報と、第2の1/0サブシステムの外部記憶装置に割り当てられている場合に該外部記憶装置の第2の1/0サブシステムにおける装置アドレスとを格納するテーブルと、前記第1のホストコンピュータから、リードすべき外部記憶装置アドレスを含む、かつ、前記可変登録形式インターフェースに繋がったリード要求を受け取った時、前記テーブルを参照して、前記リード要求に含まれる外部記憶装置アドレスに、中の装置アドレスが、前記第1の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変登録形式インターフェース

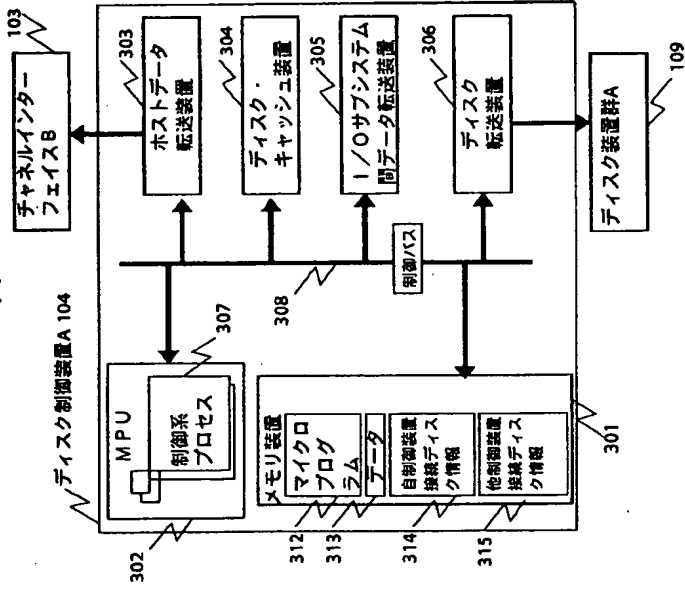






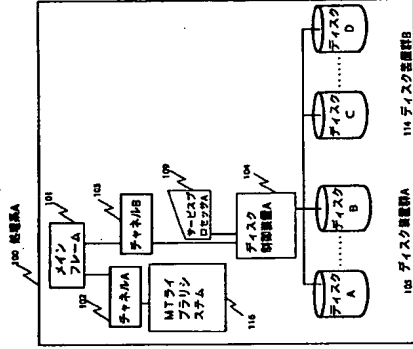
【図3】

図3



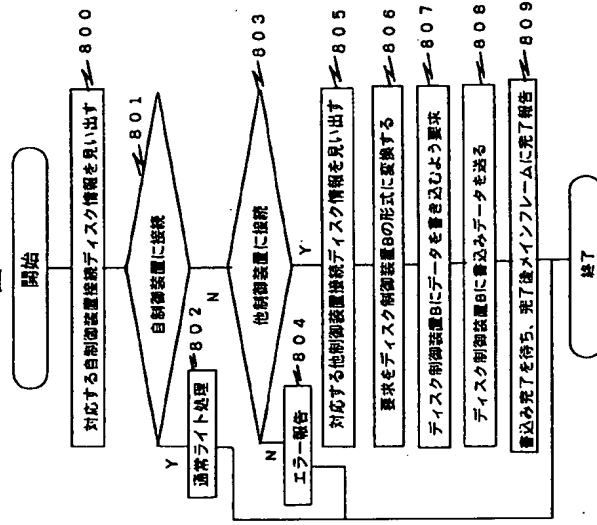
【図6】

図6



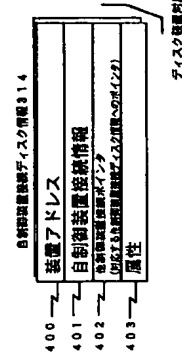
【図8】

図8



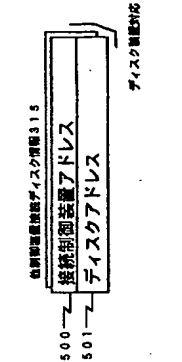
【図4】

図4



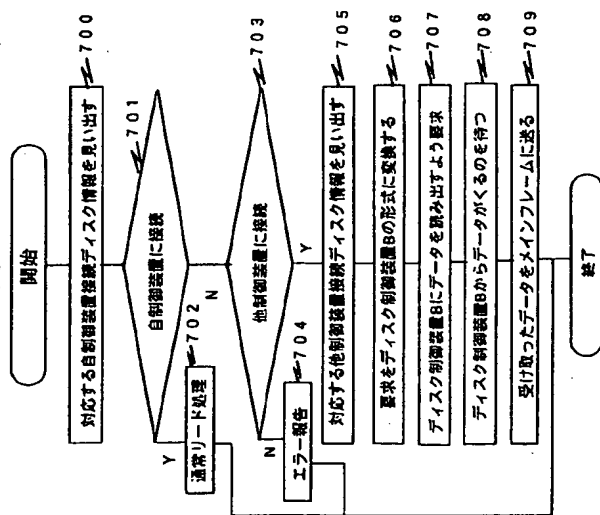
【図5】

図5



【図7】

図7





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